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RADIUM

EDITED BY
CHARLES H. VIOL, Ph. D.
AND
WILLIAM H. CAMERON, M. D.

VOL. XI

JUNE, 1918

No. 3

CONTENTS

Radium in Tuberculosis of the Skin. W. H. B. Aikins, M. D.	33
Present Status of the Local Application of Radium and X-Rays. Walter A. Weed, M.D.	41
American Radium Society.	45

REVIEWS AND ABSTRACTS

T. J. Watkins, M. D. Radium in Haemorrhage at the Menopause	46
H. H. Wiggers, M. D. Haemorrhage at the Menopause	46
H. W. E. Walther, M. D. Tumors of the Bladder	47
Hugh Hampton Young, M. D. Recent Progress in the Treatment of Cancer of the Prostate, Seminal Vesicles and Bladder	48
G. C. Maiolo, Clinical Observations on Fifty Cases of Uterine Carcinoma Treated by Radium	48

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A MONTHLY JOURNAL DEVOTED TO THE CHEMISTRY
PHYSICS AND THERAPEUTICS OF RADIUM
AND RADIO-ACTIVE SUBSTANCES

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RADIUM

A MONTHLY JOURNAL DEVOTED TO THE CHEMISTRY, PHYSICS AND
THERAPEUTICS OF RADIUM AND RADIO-ACTIVE SUBSTANCES.

Edited and Published by Charles H. Viol, Ph. D., and William H. Cameron, M. D.
with the assistance of collaborators working in the fields of
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VOL. XI

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No. 3

RADIUM IN TUBERCULOSIS OF THE SKIN

BY DR. W. H. B. AIKINS, TORONTO.

Tuberculosis of the skin assumes various forms, the most common being lupus vulgaris. It also includes a group of cutaneous eruptions known as tuberculides, all of which, according to Sequiera, (1) exhibit the following characteristics:

1. They appear in a tuberculous subject who reacts to tuberculin.
2. The eruption is usually bilaterally symmetrical.
3. The histology suggests tuberculosis.
4. Most of the cases tend to spontaneous recovery.
5. Koch's bacillus is generally absent.
6. Inoculation of the guinea-pigs is seldom successful.

Several hypotheses have been suggested from time to time to explain the ætiology of these tuberculous lesions, some have assumed that they represent a reaction of the skin to a toxæmia due to a pre-existing tuberculous focus; others that they are due to the presence in the circulation of dead tubercle bacilli, whilst a third assumption is that they are due to emboli consisting of bacilli of a low degree of virulence. Rist and Roland (2) base a new hypothesis upon an extensive series of experiments on guinea-pigs. Human and bovine tubercle bacilli were injected intradermically into these animals one to four months after subcutaneous or intraperitoneal injection of similar organisms, the secondary inoculations invariably resulting in symptoms of tuberculosis. They conclude that these tuberculous lesions are due to endogenous re-inoculation of an individual in whom there is already present an active or latent tuberculous focus, and believe that this view is confirmed by the fact that in such cases a positive cuti-reaction to tuberculin is invariably obtained.

*Reprinted from the Canadian Practitioner and Review, XLIII, 42-45, February, 1918. Read at meeting of Canadian Medical Association, Montreal, June, 1917.

Lupus Vulgaris. This is the most common form of tuberculosis of the skin. Its most frequent site is in the face, more especially the nose and adjacent tissues, but it may occur on any part of the body. It often develops on the operation scar after removal of tuberculous cervical glands.

Knox (3) is of the opinion that, from the point of view of treatment, each case of lupus should be judged on its own merits, as in some instances radium appears to be the best possible form of treatment, whilst others respond best to x-rays, and others again to treatment by the mercury vapor lamp. As a routine treatment for this disease the Finsen light is, in my opinion, greatly to be preferred to radium, but where it fails to effect cure or improvement, radium sometimes proves of great value. Unscreened exposures of one or two hours' duration should be given until a destructive reaction is produced. The resulting scar is unusually firm, smooth, supple and inconspicuous.

Brockært (4) discusses the treatment of lupus by radium, which he thinks has not taken its proper position in rhinolaryngology. It has been found most useful when the disease affects the cavities, such as the nasal cavity and the larynx, which are more or less difficult of access by other therapeutic measures. Brockært is in the habit of using special applicators with flexible handles, suitable for insertion into either the nose or larynx (in the latter case shaped like a laryngeal mirror), covered with rubber caps, and in some cases with an aluminum envelope as well. In his paper he gives full details of the technique, and seems to have considerable confidence in the efficacy of his method if the directions given are closely adhered to.

There do not appear to be any very extensive statistics in literature in regard to the treatment of lupus by radium. Danlos (5) who in 1901 reported seven cases of lupus vulgaris with good results, was the first to attempt it, and in the following year three cured cases were reported by Blandamour. (6). In 1910 Barcat (7) reported two cases treated by radium with good results, one of lupus of the nose, and another of lupus of the nose and cheek, the lesions healing in the latter case within two months after a single application of radium.

In 1911 Wichmann (8) reported 30 cases of lupus, treated either by radium alone or in combination with other measures, many of which had remained without recurrence for four years, and in the following year he reported 112 cases with 44 cures (39.3 per cent.) (9) Jungmann (10) reports a case in which lupus of the ala nasi has remained without recurrence for two years, and Dautwitz (11) two cases, in one of which the lupoid focus on the face was 6cm. in diameter. Cure resulted, and when seen two and one half years later there was no recurrence. In the other cases extensive lupus of the face in a girl of fourteen was cured, with a good cosmetic result.

Professor Haslund (12) of the Finsen Light Institute, Copenhagen, has treated 31 cases of lupus vulgaris of the face by radium, sometimes associated with Finsen light treatment, x-ray treatment or electrolysis. Six cases were cured, in one of which cure has persisted for two and a half years. Although in his opinion radium is inferior to Finsen light treatment, he thinks that his results show that it is possible to obtain healing and permanent cure by it in certain cases in which the disease is not extensive. Dr. Benham Snow (13) states that he has had uniformly successful results from radium treatment in his cases of lupus vulgaris,

provided that they are not so far advanced that tissue destruction is very extensive.

Schramek (14) uses a combination of radium and drug treatment, and claims that it produces better results than the use of radium alone. Two to three spoonfuls of a solution of iodide of potassium or iodide of sodium are administered internally about an hour and a quarter before the first irradiation. (It has been shown experimentally that by this time most of the drug will have reached the circulation). He gives fairly strong radiation, using a silver filter of 0.07 millimetres, covered by a layer of gutta percha, the time of application varying from one to two hours. Before giving a second application he waits for complete subsidence of the reaction, the administration of iodides being continued. He has treated eight cases with clinical cure, and thirty cases are still under treatment give promise of a successful result. No lupoid infiltration can be demonstrated in the cicatrices left after the radium treatment, and the cosmetic result in the cured cases is especially good. Some of these last cases were very severe and extensive. He believes that the elective influence of radium upon tuberculous cells is increased by a combination with the iodides, and that necrosis occurs much more rapidly than in non-iodised tissues with a similar apparatus and duration of radiation. His cases were kept under observation for over a year after healing had occurred.

Lupus erythematosus is generally regarded as distinct from tuberculous lupus, but it often occurs in tuberculous subjects, especially women, and the serum of those suffering with it agglutinates the tubercle bacillus. It is intractable to most forms of treatment, but considerable success has attended the use of radium. Wickham and Degrais (15) state that in their experience radium has given very satisfactory results, whilst no other form of treatment has proved effective. This applies to the chronic form of the condition. Dr. Frank Simpson (16) reports ten cases, varying in severity from small patches to the involvement of a considerable part of the face. He gives exposures of from thirty to forty minutes in the first place, followed a few days later by two shorter ones of from ten to fifteen minutes. In all the cases there was marked improvement, and five of them remained well and free from recurrence when last seen. He finds that the chronic or fixed form of the condition is best treated by destructive doses of radium.

Abbe, of New York, has also had surprisingly good results where the lesions were extensive and many of great chronicity.

Sibley (17) says that in his experience considerable improvement usually occurs in lupus erythematosus. He recommends the use of an applicator of a quarter to half strength, the rays being either unscreened or screened with 0.01 mm. of aluminum, and the duration of the exposures varying from forty minutes to an hour. It is necessary to continue the treatment for a prolonged period at frequent intervals.

Dawson Turner (18) in the Report of the Edinburgh Radium Institute, reports a case in which several isolated areas in the scalp were affected with lupus erythematosus. The condition has proved refractory to other forms of treatment, including the x-rays, but apparent cure resulted from a dose of 10 milligramme hours of radium to each of the patches. He applied full doses with unscreened apparatus to the margins of the patches and the tissue a little beyond them, and when last seen the skin had become perfectly healthy and soft.

Dr. Douglas Heath (19) discusses the possibility of the develop-

ment of malignant tumors on the scar of healed lupus vulgaris. He reports a case in which sarcoma developed on the scar of old lupus of the upper lip and nose, recurring rapidly after two operations and treatment by x-rays. Under radium cross-fire it diminished in size and ultimately fell off. Radium was applied to the base of the tumor, and when seen four months later there was no recurrence. In his opinion radium is more efficacious in this class than any other form of treatment.

Dr. Riddell (20) reports the development of an epithelioma on the scar of lupus of the right temple of twenty-five years' standing, which had been treated by the x-rays. Two applications of radium resulted in complete healing, and when last seen there had been no recurrence.

Scrofuloderma. Scrofuloderma usually involves the skin over breaking down scrofulous glands, infection being due to the underlying tuberculous focus. It may also occur near fistulæ due to tuberculosis of bone. Breaking down of tuberculous glands may lead to the formation of sinuses, from which the skin is secondarily infected. Scrofuloderma occurs most often in children and young people, but exceptional cases are met with in elderly people. Wickham and Degrais believe that radium is of great service in this condition, provided the cases are carefully selected. Where the tissues are deeply infiltrated and ulcerated they recommend unscreened radiations of great intensity.

Verculosis. Wickham and Degrais found radium very beneficial in this wart-like form of tuberculosis of the skin. They recommend the use of more or less penetrating rays, stronger and more destructive doses being employed than in ordinary lupus. Simpson reports two cases. In one, a man aged thirty-five, there was verruca necrogenica of the third finger of the right hand, which completely disappeared under radium treatment. In the second case, which is still under treatment, the lesion was associated with enlargement of the cervical glands, and the results so far are encouraging.

Verculosis may be due to auto-inoculation with the tubercle bacillus in those who are suffering from tuberculosis, but is more common in doctors and others attending such patients, and those who come into contact with the bodies of those who die from the disease.

Tuberculous Ulcer. Acute tuberculous ulcer usually occurs only in individuals suffering from visceral tuberculosis, and is generally associated with enlargement of the lymphatic glands.

Tuberculosis of Glands. In cases in which surgical measures have been declined for cosmetic reasons radium often proves of considerable value, either when used alone or as an adjunct to vaccine treatment. In such cases it is advisable to give heavily screened exposures of thirty or more hours' duration, and when practicable an effort should be made to secure "cross-fire" radiation. If the glands are caseating, radium treatment is of very little use.

Knox states that while tuberculous glands usually diminish in size and become quiescent under radium, they very rarely entirely disappear, and are likely to become active again after a longer or shorter interval. He therefore is of the opinion that operation should be considered when the disease becomes latent, and radium applications given subsequently with the object of preventing recurrence. In view of the frequency with which the thoracic glands are involved in these cases, he recommends that these glands also should be treated by radium.

In the Report of the Radium Institute, London, for 1913 (21) two cases of tuberculous glands are referred to. In one, a woman aged 24,

two tuberculous glands had been operated upon, and afterwards treated by "cross-fire" radium. Under the treatment they were reduced to very small hard nodules, and have given no further trouble. In the other case tuberculous glands were fixed by the scar of an old sinus. Under radium they were reduced to the size of shot, and became movable under the skin. The scar was scarcely noticeable. Hayward Pinch states that prolonged exposures from twenty to thirty hours' duration in all, with a heavily screened apparatus, generally cause progressive reduction in the size of the glands.

Tuberculous Sinuses. The difficulty which is frequently encountered in obtaining healing of the sinuses persisting after removal of tuberculous cervical glands is well recognized. In several of such cases it has been found that radium treatment, carried out by the insertion of a powerful tube of radium directly into the sinus, has been most successful in bringing about the destruction of the diseased tissue, and in stimulating the development of healthy granulations, ultimately resulting in general obliteration of the diseased focus. Schramek has found the combination of drug and radium treatment, which has been previously referred to, very beneficial in these cases.

The following cases may be of interest:—

CASE I.—A nurse 52 years of age came under observation in May, 1911, with a tuberculous ulceration of the left nostril, which she stated had developed ten years previously. Various kinds of local treatment had been tried, including caustics, electrolysis, curettage and the x-rays, but the condition continued to progress. When she came to me there was involvement in the margins of the nostrils, resulting in the projection of a fungating ulcerated naevus from about the nasal orifices. On the nose and adjacent portion of the cheek were several typical lupus nodules.

Her appearance was greatly improved by radium treatment carried to a point sufficient to cause destruction of the diseased tissue. The ulcerated areas healed, and although the nose had been destroyed to such an extent that a certain amount of permanent deformity existed, the further progress of the tuberculous process was arrested. And the report at the present time is that the condition is quite satisfactory.

CASE II.—A young woman, aged 26, had a definite lupus ulceration of the left cheek, which had first developed five years before coming under observation. She described it as a "cold sore," which would not heal. A destructive exposure of radium resulted in complete disappearance of the ulcer, with complete healing.

CASE III.—A woman, 43 years of age, presented a patch of lupus on the right cheek. It was roughly oval in shape, measuring $1\frac{3}{4} \times 2\frac{1}{4}$ inches. Twenty-five years previously she noticed a small spot of discoloration, which gradually extended centripetally leaving an area of scar tissue in its centre. This central area was surrounded by a thickened zone of a pinkish yellow color, which on pressure under a glass slide exhibited the "apple jelly" appearance so characteristic of lupus. The treatment adopted in this case was destructive dosage of the radium rays. This resulted in the disappearance of the thickening of the tissues, leaving a scar, slightly paler than the normal skin. In this case, trichloroacetic acid was used with good effect for the treatment of isolated patches of lupus.

CASE IV.—A patient, aged 29, stated that she first noticed lupus on the right side of the nose five years previously. She had treatment by the x-rays, caustics, and carbon dioxide, but in spite of these measures the lesion continued to spread, and when first seen all the skin of the nose

was more or less involved. It presented a patchy appearance, owing to the fact that a certain amount of healing had taken place, leaving pale and atrophic scar tissues on the margin of which the tissue was raised and of a reddish yellow appearance. She had radium exposures on three occasions with very great benefit, as the tissues are becoming normal in color, and the thickening has disappeared. This case is still under observation.

SCROFULODERMA.

CASE I.—Six months previously the patient, aged 42, noticed three or four pimples on the left side of the cheek. These gradually increased in size until, at the time when the first case came under my observation, there was a patch, four and a half inches in length by one and a half inches in width, covered by warty nodules on a scarred base. The picture was that of typical scrofuloderma. Radiations were given of sufficient intensity to produce a severe reaction, the result being a slow, but progressive, disappearance of the lesions, the site of which has now become perfectly smooth.

CASE II.—A boy of fifteen exhibited a chronic ulceration of the right cheek, quite typical of scrofuloderma. From the ulcer, which was about the size of a five-cent piece, a sinus passed in an upward direction for two inches, the skin over it being of a dusky blue color. The lesion had followed a "pimple" which had been noticed about two years before.

The sinus was treated by incision and curettage, and the involved area of the skin by exposure to radium. Six weeks later the ulceration had completely healed.

CASE III.—A girl, twelve years of age, exhibited tuberculous infection of the skin over the upper part of the sternum, which had been present for over a year. A certain amount of spontaneous healing had already taken place, but the centre of the scarred area still showed a patch of ulceration, measuring $\frac{1}{2}$ inch x 1 inch. The ulcer had a sluggish base, with ragged undermined edges of a dark purplish tint.

Under radium the extent of the ulceration markedly diminished and there is every indication that it will soon be completely obliterated.

VERCULOSIS.

CASE I.—A colleague of mine, who cut his finger when opening a bottle of tuberculous sputum, subsequently developed a tuberculoma of the "post-mortem wart" type. Exposure to radium rays of sufficient intensity to produce a marked reaction rapidly brought about its destruction, with subsequent healing of the lesion.

CASE II.—A lady, aged 58, had suffered for ten years from a tuberculous infection of the nail of the first finger of the left hand. The nail had been removed, but the infection still persisted. Pale, unhealthy-looking granulations, from below which pus could be made to exude by pressure, covered an area three-eighths of an inch in diameter. The condition responded satisfactorily to radium treatment, and the lesion has now quite disappeared.

ACUTE TUBERCULOUS ULCER.

CASE I.—The patient was a girl, aged seventeen, who consulted me on December 3rd, 1914. She stated that an appendicectomy had been performed in January, 1914, and that at the operation the appendix was found to be tuberculous. Four or five days after the operation small papules, which subsequently ulcerated, were observed on the dorsum of the right hand. These healed some weeks after. Papules then appeared on the anterior surface of the right wrist and the dorsal surface of the index finger of the right hand.

When she first came under my observation these also had undergone ulceration. Five small ulcers about three-eighths of an inch in diameter, with irregular outlines and undermined edges of a dusky purple color, were scattered over an area on the wrist, which was about two inches square. A similar ulcer was present on the index finger and on the sole of the left foot. In this case the association of the tuberculous ulcer with visceral tuberculosis was quite obvious.

Treatment by applications of radium over the ulcerated areas, in combination with general tonic measures, resulted in healing of the ulcers in about six weeks' time.

CASE II.—In April, 1916, a dental student aged twenty-two, while on active service abroad with the Canadian Army Dental Corps, noticed a pustule at the junction of the cheek and ala nasi on both the right and the left sides. He incised the pustules, but they did not heal. Under instructions from his Medical Officer he tried various ointments without healing taking place, and as a matter of fact the ulceration progressively extended. On returning home to complete his College course he was referred to me for treatment by Dr. J. S. Graham. When I saw him there was present at the right ala nasi an oval ulcer $\frac{3}{4}$ inch $\times$ $\frac{1}{2}$ inch in extent, with an irregular base, presenting unhealthy granulations and thin slightly elevated edges. At the left ala nasi was a similar, but smaller ulcer, about the size of a five cent piece.

The von Pirquet reaction was positive. The history of this case appeared to indicate fairly conclusively that in the course of his dental work among the troops the patient had inoculated himself locally with the tubercle bacillus.

Radium treatment was undertaken, sufficiently intensive to produce a marked reaction, and resulted in satisfactory healing of both the ulcers, the smaller one being healed in six weeks' time. The larger ulcer required a second exposure before complete healing was produced.

CASE III.—The patient, a man aged thirty-two, presented an irregularly ovoid ulcer on the chin, measuring $1\frac{3}{4}$ inches $\times$ 1 inch. This had developed one month previously on a nodule which had been present for five months, and had undergone necrosis. The edges of the ulcer were sufficiently clean-cut to suggest the possibility of luetic origin, but this was contra-indicated by the fact that a Wassermann reaction proved negative. Exposure to radium resulted in gradual healing.

CASE IV.—A girl aged seventeen, the daughter of a colleague, came to me with a history of the development of a number of papules on the forehead and nose, which subsequently ulcerated. Electrical treatment had no effect. When referred to me for radium treatment there was a large number of papules on the forehead and nose, some of which were undergoing necrosis and breaking down. Exposure to radium sufficient to produce a marked reaction, brought about a marked improvement in the appearance of the lesions, but as fresh nodules continued to develop it was decided to try the effect of subcutaneous inoculations of tuberculin. It was found that 6 to 8 minims of B. E. 1 in 20,000 produced both a systemic reaction, as evidenced by slight pyrexia and headache, and a focal reaction, shown by some erythema of the affected parts. By giving a dose of tuberculin weekly, sufficiently small to avoid such reaction, gradual improvement in the condition was brought about. Fresh papules ceased to appear, and the skin resumed its normal appearance. This improvement has now persisted for some months.

CASE V.—A boy aged three and a half years, (23) was treated by

radium for a tuberculous ulcer on the dorsum of the right hand. It had been present for two years, and had been treated by iodine, caustics and other measures. Two patches of ulceration, measuring nearly half an inch in diameter, slightly elevated and of a dark color, were situated close to one another. Radium treatment was commenced on December 3rd, 1912, and continued for a fortnight, the total dosage amounting to 20 milligramme hours. A screen of aluminum only was employed. A month later the patches of ulceration were covered by a good scab, which fell off at the end of January. By this time the lesions had almost completely disappeared, but to make the cure more certain a further dose of 13 milligramme hours was administered.

The writers, on the subject seem to be practically unanimous in the opinion that radium is an important and valuable addition to the therapeutic measures employed in tuberculosis of the skin. In considering the question of absolute cure, however, it should always be remembered that the local lesions may be only the expression of a systemic disease, and the possibility of recurrence should be borne in mind. This being so it is scarcely necessary to emphasize the necessity of keeping a close watch on the apparently cured cases for a prolonged period, in order that relapses, if they occur, may be dealt with at an early stage.

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**THE PRESENT STATUS OF THE LOCAL APPLICATION
OF RADIUM AND X-RAYS.**

BY WALTER A. WEED, M. D.,
Birmingham, Ala.,

Radiologist, Birmingham Infirmary

Owing to some obscure quality in our being which we, for lack of a better term, call "human nature," we are very prone either to ban or bless, most unreservedly and whole heartedly, any new discovery or invention. It may be that desperation over our inadequacy to cope successfully with such urgent problems as malignant growths was the prime reason for the enthusiastic welcome extended to the use of the x-ray. That the x-ray was a valuable agent to the surgeon was soon demonstrated, but because it did not immediately prove itself a wonder worker, it was relegated to the background to make way for the spectacular introduction of radium.

First greeted as a modern mystery of miracles, now, after a few years, bearing the condemnation of a few of our best known surgeons, radium is becoming known at its true value. It is not a panacea, it is not a fake; it is, properly used, one of the greatest agents known to the medical profession, and one whose value is not lessened by recognizing its limitations. We have not yet, in any branch of medical science or surgical art, discovered any remedy or method that we can truthfully consider infallible, even in carefully selected cases. Over a decade has passed since the accidental discovery of the therapeutic value of radium—over ten years of active use; yet only in the last four years have really practical methods of treatment been developed. We have been hampered by the extreme scarcity and great expense; yet, now that such large quantities of carnotite ore have been discovered and utilized in our own country, we may hope for greater opportunities for the therapeutic application of radium.

It is essential that some of the properties of radium and x-rays and methods of application be understood in order to demonstrate their value in the treatment of disease. The multitude of x-ray equipments all over the country has to a certain degree worn away its novelty; while the comparative scarcity of radium clinics leaves much to the conjecture of even the average doctor. Radium is constantly giving off three grades of invisible rays, the alpha, beta, and gamma. The range of penetration of the alpha rays is very short, but its chemical action great. The beta ray is more penetrating; it easily influences living tissue several millimetres below the surface and possesses certain chemical properties. The gamma ray is similar to the hard x-ray, but of shorter wave length and more powerful penetration. Therefore we have, in the therapeutic application of radium four factors to consider: amount of radium, screening, length of exposure, and distance between the radium and the area to be treated. A fifth factor might be mentioned—personal idiosyncrasy. In the use of the x-rays we take into consideration the voltage and amperage of the current used instead of "quantity" as with radium, the other factors being the same.

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Read before the Medical Association of the State of Alabama, Montgomery, April 19, 1917.

So far as is definitely known the action of both radium and x-rays is purely local. They have no effect, favorable or adverse, on metastases, nor will the treatment of a primary lesion effect a secondary growth of some other part of the body; the rays must be applied to the circumscribed area involved. Noted research workers, both at home and abroad, have proved and recorded these laws of radium: near the location of a tube of radium, a complete local destruction of all tissues is effected, if so desired, depending upon screening, length of exposure, etc.; at slightly increased distance there is more or less gradual destruction of malignant cells with increased growth of connective tissue; beyond this there is only partial destruction of cancer cells with less overgrowth of connective tissue; still further on there is a stimulating effect to the malignant cells; after which, the radium has no effect.

The changes produced in the tissues by x-rays are similar to, but not identical with, those produced by radium, notwithstanding evidence to the contrary by a number of x-ray and radium workers of more or less repute. Wickham and Degrais (1) say: "If a current of electric sparks be passed into and split up in a glass vacuum tube (Crookes' tube), it is filled with special fluorescence, and certain rays, such as anode, cathode, and x-rays are produced respectively analogous to, but not identical with, the alpha, beta, and gamma rays of radium." My own experience leads me to believe that there is a difference in the biological effects of the two agents and that a radium dermatitis or ulcer heals much more rapidly than one produced by x-rays. Admitting that there is a close similarity between the effects of radium and x-rays, there would still be clear cut indications for both their separate and conjoint use. This is especially true in gynecological work, and in the treatment of malignant conditions involving cavities. Generally speaking, where there is a large area to be treated, as in carcinoma or sarcoma of the breast or a large area of obstinate eczema, the x-rays are to be desired; while in the treatment of uterine conditions, or in epitheliomata of the mucous surfaces radium is preferable because of its ease of application and because it can be brought into close proximity with the part to be treated. It might be said in this connection that, in my opinion, their combined use is often better than either when used alone.

Undoubtedly as we gain in knowledge and experience we will understand more clearly the varying and equal properties of these two great agents. We will no longer look upon them as rivals, but as partners; we will no longer madly advocate one because we possess it, but will endeavor to utilize it to its greatest capacity, and when necessary call upon the other. As our technic improves we will doubtless discover that in a great many conditions one is as applicable as the other.

The x-ray was first given great prominence in the treatment of epitheliomata, and although its first ardor of enthusiasm is passed, it is not only holding its own, but is constantly gaining ground in the treatment of malignant conditions of the cutaneous surface. In the hands of competent workers the relative percentage of cures is contesting strongly the percentage cured by radium. In several cases I have been able to obtain apparent cures with radium that had resisted treatment with x-rays by some of the most capable röntgenologists of the South. Perhaps the experience of other men may prove the reverse. It may be pointed out here that after all it might have been the combined use that did the work successfully, and that had radium been used in the beginning it might have been necessary, or at least advantageous, to follow with x-rays. In

the treatment of naevi, small eczematous patches, keloids, etc., the consensus seems to favor radium as the agent of choice.

In the field of gynecology both radium and x-rays are of inestimable value, and are going to be used more and more as our technic improves and results become known. In cancer of the breast unless hopelessly inoperable, a thorough dissection is always advisable, followed by thorough x-ray or radium radiation. The x-ray is preferable because of the possibility of irradiating a large area more homogeneously than if done with radium. The x-rays are also preferable, in my opinion, in the treatment of large pelvic or abdominal growths for the same reason. For thirty years and more the surgical cure of cancer of the uterus has been the aim of some of the brightest minds of the profession; tireless efforts have been exerted to prevent, by surgical methods, the extension of the disease. The different methods of hysterectomy and in involvements of the cervix, amputation and cautery, all have been tried with varying degrees of success, but even in carefully selected cases the number of fatalities has been appallingly large. Even with present improved methods, and in the hands of most skillful operators, more than half of the cases fail to respond. Admitting these things as true, surgery still has precedence in a large number of cases. The operative treatment of malignancies confined to the fundus is always advisable. When the involvement is general it is a mooted question as to whether operation is best; it is impossible to remove all of the diseased tissue; tissues that formerly clung to the central organs are forced to retract back upon their posterior anchor, the pelvic wall. The pressure upon the sacral nerves is thus intensified sometimes to the extent of involving the lower limbs until the pain is almost unendurable; and, at the same time, the recurrent growth is rapidly increasing.

We have therefore adopted these rules: Operate in every approved operable case, as in former days. Use x-rays or radium immediately afterwards, but do not apply directly over the site of the incision. Use x-rays or radium again about four to eight weeks later. Radiate all borderline cases preferably with radium in the uterus and x-rays with a hard Coolidge tube through the abdominal wall. Use radium and x-rays in all advanced inoperable cases, not with the hope of effecting a cure, except possibly in an extremely small percentage of cases, but, because, when not too far advanced, the growth may be retarded over a considerable period of time, nearly always alleviating the pain and checking the foul discharge. Also, it is sometimes possible to render an inoperable case operable.

In cases in which there is a large pelvic involvement, I favor highly a combination of radium and x-rays. It is thus possible to crossfire the tissues completely and thereby obtain the combined beneficial results from the hard rays of radium and the hard rays from the Coolidge tube. Doubtless to a great many the use of both radium and x-rays in the treatment of deep seated malignant conditions has been more or less a disappointment, however, there are other conditions, not of a malignant nature confronting the gynecologist in which our expectations have been more than realized and our optimism justified. I refer especially to uterine fibroids with or without menorrhagia or metrorrhagia; also, to menorrhagia and metrorrhagia due to remote and indefinite causes.

Kelly (2), in an article on The Radium Treatment of Uterine Fibroids, says: "Tumors of all kinds have been treated and the submucous and subperitoneal, and even the pedunculate, have seemed to respond as

well as the interstitial." In reporting thirty-six cases he says: "The results in every case but one have been either the shrinkage of the tumor or its complete disappearance. . . . One of the most striking results," he adds, "is upon the menstrual function, where the radium can in all cases be depended upon to bring about complete amenorrhoea. . . . If care is taken to avoid giving too large a treatment, it is possible in some cases, especially with young women to avoid amenorrhoea." Lange (3), of Cincinnati, says: "The x-ray treatment of menorrhagia and uterine fibroids by the production of the artificial menopause has been given a new impetus by the invention of the Coolidge tube. . . . If the proper technic is employed, the effect of the Coolidge tube radiation upon the ovaries is one of the most certain of medical phenomena. If sufficient radiation be absorbed by the ovaries they will cease to functionate in their fullest physiologic aspect and a cessation of menstruation will result."

It is thus seen that in the hands of competent men the results obtained, although produced by different agents, are practically parallel. However, I do not think the indications are by any means always the same, and that the method most available can always be substituted for the other. My own opinion is that in selecting the method of treatment of uterine fibroids we should be governed by the type of tumor to be treated, and also should take into consideration other conditions that might be complicating factors. Kelly (4) says: "While radium has thus made a place for itself as the treatment of election, the best possible treatment in fibroid tumors, it does not take the place of operation in the exceptional case, for instance, where there are urgent pressure symptoms, or other complicating conditions, such as diseased appendix, gallbladder, etc."

The submucous varieties, by reason of their location and consequent composition, cause copious and weakening hemorrhages, and there is a resulting complication of the endometrium. For this reason radium is preferable to x-rays in such cases, as it acts directly upon the endometrium thus causing a cessation of the bleeding by its effect upon the endometrium primarily and the ovaries secondarily. While the x-rays perform the same phenomenon, it is by affecting the ovaries primarily and, possibly to a less degree, the endometrium. Therefore, the radium produced menopause is usually much less severe in its effects than that produced by x-rays. In the interstitial and subserous varieties, I also believe that radium is more dependable than x-rays for reasons already explained, while in the pedunculate the x-rays are probably as efficient as radium. In both the subserous and pedunculate tumors I believe their combined use—radium in the uterus and x-rays through the abdominal wall—is theoretically and practically correct.

Radium is of equal value in the treatment of obstinate cases of menorrhagia and metrorrhagia not associated with fibroid tumors. In a great many of these cases it is desirable to bring on the menopause as there is often danger of impending malignancy. This is invariably accomplished easily with but few of the pronounced symptoms that usually accompany the menopause. It is preferable to the x-rays because it can be given with much less inconvenience and risk to the patient; also, as the endometrium is primarily affected and the ovaries secondarily, the nervous phenomena accompanying and following the menopause are much less noticeable. In the treatment of menorrhagia of young women the dosage is so easily regulated that the desired effect may be produced in many cases without bringing on a complete amenorrhoea, the functioning

power of the ovaries not being entirely destroyed. I have treated a number of cases of uterine hemorrhage in which the patients had had repeated curettages without receiving permanent benefit; not one of these cases failed to yield to radium. One advantage not mentioned of radium over x-rays in the treatment of pelvic conditions is that, by virtue of its method of application, there is no danger of dermatitis. It is known that the mucous membrane is far more tolerant of both x-rays and radium than is the cutaneous surface. This is no little consideration in the treatment of these conditions. When both are used conjointly it is always possible to keep the dose of the x-rays well within the bounds of safety.

I have made no attempt to discuss the various conditions more or less amenable to radium and x-rays, but to mention only some of those in which their value as therapeutic agents is firmly established and their supremacy acknowledged.

REFERENCES.

1. Wickham and Degrais: Quoted by Russell H. Boggs, in *American Journal of Rontgenology*, April, 1915, p. 731.
2. Howard A. Kelly, *Surgery, Gynecology and Obstetrics*, March, 1917, p. 271.
3. Sidney Lange, *American Journal of Rontgenology*, February, 1916, p. 72.
4. Howard A. Kelly, *Woman's Medical Journal*, January, 1916.

AMERICAN RADIUM SOCIETY

The Third Annual Meeting of the American Radium Society will be held at the Palmer House, Chicago, Monday, June 10th, 1918, beginning promptly at 9:30 A. M. This is the day preceding the opening of the Scientific Session of the American Medical Association in Chicago. The Committee on Scientific Program has arranged for a most attractive session, the following being the program:

President's Address, Dr. John M. Lee, (Rochester, N. Y.); "The Value of Combined Methods of Treatment," Dr. Russell H. Boggs, (Pittsburgh, Pa.); "The Action of Radium Rays on Tissue," Dr. James Ewing, (New York); "Radium in Gynecology," Dr. Thos. J. Watkins, (Chicago); "Radium, An Aid to General Surgery," Dr. Joseph B. Bissell, (New York); "Internal Use of Radium," Dr. Douglas C. Moriarta, (Saratoga Springs, N. Y.); "Radium in Military Hospitals—A Report," Dr. Wm. H. Cameron, (Pittsburgh). On Tuesday morning at 9:00 o'clock, Dr. Henry Schmitz will hold a radium clinic at St. Mary's Hospital. Monday evening at 7:30, will be held the annual dinner of the American Radium Society. The present officers of the Society are: John M. Lee, Rochester, N. Y., president; H. K. Pancoast, Philadelphia, secretary; R. E. Loucks, Detroit, treasurer; Frank E. Simpson, Chicago, chairman of committee on arrangements; Wm. H. Cameron, Pittsburgh, chairman of committee on scientific program.

REVIEWS AND ABSTRACTS

T. J. Watkins, M. D.: Radium in Haemorrhage at the Menopause. Surg. Clin. Chicago, 1917, i, 1031. Abstracted in Surg., Gynec., and Obst., February, 1918, p. 170.

"In the first case reported by the author, the patient, aged fifty, suffered from persistent menorrhagia of the menopause after a vaginal fixation done seven years before. Under nitrous oxide the patient was curtted, but nothing abnormal was found. Fifty mg. of radium were inserted into the uterine cavity, the radium screened by one mm. of gold covered with rubber and left in place for twenty-four hours. Slight bleeding followed for a week. Three months later the uterus was atrophied; the general condition was excellent. The radium had acted on the graafian follicles and produced definite changes in the endometrium and in the blood vessels of the uterus."

"In the second case, the patient, aged forty-seven, suffered from excessive menstruation. The uterus was large but showed no neoplasms. Twelve hundred mg. hours of radium were used. Six months after application the bleeding had been entirely stopped."

"The radium element is in a small glass capsule; this is enclosed in a silver capsule and placed in a small gold capsule which is covered with rubber. To this a cord is attached to guard against losing the radium. It is introduced with the greatest aseptic precautions. A capsule of fifty mg. radium is left in place for twenty-four hours, i. e., twelve hundred mg. hours."

"There is no pain from the use of radium. Slight nausea, vomiting, and a feeling of exhaustion are present for two or three days. Bleeding may persist for a few days following the use of radium, and leucorrhoeal discharges are often increased for two or three weeks. One menstrual period may occur after the use of radium."

"This method will probably diminish considerably the hysterectomies done for menorrhagia occurring at the menopause and for persistent menorrhagia that not infrequently follows the operation of vaginal fixation."

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H. H. Wiggers, M. D., Haemorrhage at the Menopause. J. Am. Inst. Homoeop., 1917, X 153. Abstracted in Surg., Gynec., and Obst., December, 1917, p. 562.

"Wiggers, under this title, writes of the good results from the use of radium in this class of cases. In fibroids, its application within the uterus causes destruction of the endometrium, partial or complete, depending upon the age and vigor of the patient and on the mode of application. If the endometrium is totally destroyed, amaenorrhoea results; if only partially, a decreased flow. The same applies to the leucorrhoeal discharge. Menstrual colic, whether uterine or ovarian, is relieved at the same time."

"The author has several cases in which a two-hour application brought down a profuse flow lasting 8 to 10 days to a normal flow of 3 to 4 days, remaining thus one to one and a half years, when a second application brought it to normal again. The treatment is especially to be considered in fibroid subjects who are not good operable risks, owing to anaemia or heart or kidney affections."

"In malignant conditions, the success of the treatment depends upon early recognition. In the beginning the growth is localized and strictly confined within the uterus. A radical operation is certainly the indication then, but when this is no longer feasible palliative treatment only is available and the author mentions cauterization by the Percy method, zinc chlorid, Gellhorn's acetone treatment, massive roentgen rays by the mapped-out areas and especially electric cauterizing and gamma rays of radium. By this method many are to all intents and purposes restored to almost normal health."

"Recurrence do occur and the patient may die of general carcinoma-tosis. In the meanwhile, however, they have been comfortable, their lives prolonged and in many instances they are free from suffering and foul discharges. During this treatment, alfalfa alone or combined with potassium hypophosphite is useful in building up the patient's strength. This is advocated by Ross, on the theory that in cancer cases the potassium salts are deficient and that potassium phosphite supplies this deficiency."

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H. W. E. Walther, M. D., (New Orleans). Tumors of the Bladder. *Annals of Surgery*, LXVI, December, 1917, pp. 682-701.

With regard to the use of radium the writer says:

"For malignant vesical neoplasms which in the past have been considered almost beyond any kind of tangible surgical relief, radium has opened up a new and fertile field. The possibilities of radium in the treatment of malignant growths have not yet been definitely determined. Surely much good has already been accomplished by its use, and as the action of the element is more thoroughly understood much more good will be accomplished. Among urologists, Young, Barringer and Ayres have published preliminary reports on results obtained with radium in the treatment of cancer of the bladder, particular attention being paid to the inoperable type of malignant bladder growth. *Their results obtained so far are indeed encouraging.* The applications are made by introducing a capsule of radium, screened with silver and rubber, into the bladder through the sheath of a cystoscope. Some workers have designed special cystoscopes for carrying the radium in the beak of the sheath, as in the Ayres instrument. The most ingenious instruments yet brought forward for this work are the radium cystoscopes of Young. In line with the usual thoroughness to be found in anything that Young attempts, he constructed three different models of radium-carrying cystoscopes, one for making applications to the neck of the bladder, trigone and certain parts of the lateral and posterior vesical walls, a second for treating tumors well out on the lateral walls or on the upper part of the anterior wall, and a third especially adapted for tumors located on the posterior bladder wall. These instruments have been thoroughly tested out by their talented originator in the Brady Urological Institute for three years past, and have, in a large series of cases, demonstrated beyond a doubt their practicability."

"At the Radium Institute of New Orleans a number of cases of advanced malignancy of the bladder have received treatment. The method there of applying the radium has been by placing the capsule in the end of a rubber urethral catheter and then introducing the catheter into the bladder and allowing it to remain for a certain given length of time. The results obtained have been encouraging. However, sufficient time has not elapsed and the number of cases treated to date is not large enough to warrant forming definite conclusions. It is the belief of my colleague, Dr.

E. C. Samuel, director of the Institute, that in these cases, in order to obtain the best results, applications should be made preferably through a suprapubic permanent opening."

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Hugh Hampton Young, M. D., (Baltimore). Recent Progress in the Treatment of Cancer of the Prostate, Seminal Vesicles and Bladder. Southern Medical Journal, XI, 120 to 129, February, 1918.

Over half of this interesting article is devoted to an account of the use of radium at the James Buchanan Brady Urological Institute. The author gives the following conclusions:

"The hope for cure of cases of cancer of the prostate bladder is, I believe, now very bright if early diagnoses are made."

"Early diagnoses will require education of the public to suspect slight urinary, bladder and prostatic symptoms and to report for examination. Every hematuria should be thoroughly investigated early."

"Rectal examinations should be a routine part of every physical examination and very hard areas in the prostate should be suspected."

"The perineal route alone offers excellent opportunity to cure early cases by a partial radical operation, and more extensive cases by a complete radical operation, as shown by nine definite cases reported."

"Radium, applied through the rectum, urethra and bladder, offers great benefit in extensive cases of cancer of the prostate and seminal vesicles by the new methods described. Hope of radical cure is not impossible."

"Early cancer of the bladder at the base is effectively treated by radium with the aid of three new cystoscopic instruments described."

"Vesical papillomata have a great tendency to malignancy and should have radium applied to their bases after destruction with fulguration."

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G. C. Maiolo.: Clinical Observations on Fifty Cases of Uterine Carcinoma Treated by Radium. Ann. di ostet. e ginec, Milano. Abstracted in Surg., Gynec. & Obst., March, 1918, p. 264.

"The cases reported were all inoperable cases or cases recurrent after a hysterectomy. Deducting 8 cases treated too recently to give any reliable data, the author finds that among the remaining 42, 16 were clinically and anatomically cured for a period varying from one to two years. In 14 cases there was a reduction of the tumor. In 5 cases cure has not been effected, but the general state is improved. In 7 cases there is not sufficient data to establish definite results."

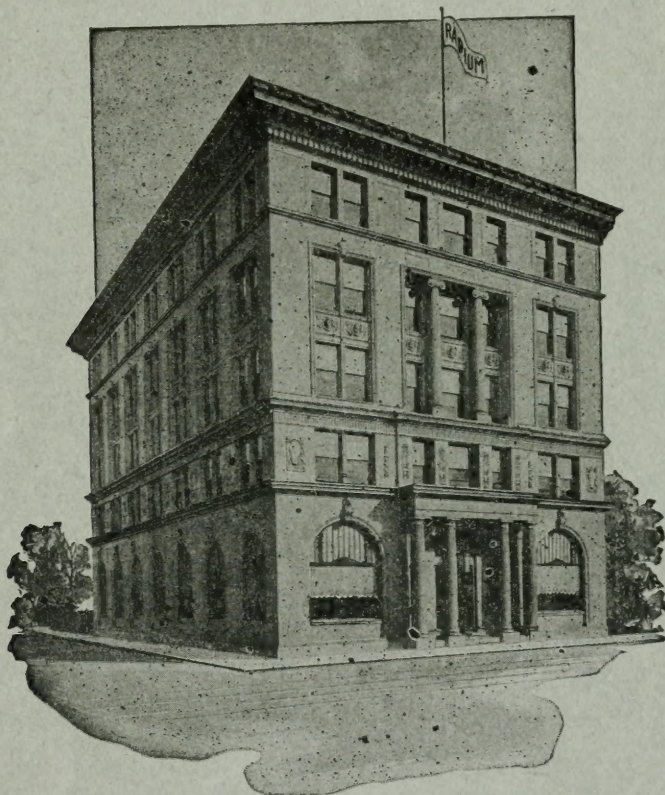
"The conclusions drawn by the author are: (1)—That direct action of radium on the neoplasm is manifested by a rapid diminution of the tumor or even by a complete disappearance demonstrable both clinically and histologically. (2)—That indirect action is shown by the effect on the concomitant symptoms; pain, metrorrhagia and fetid odor disappear and there is general improvement in the condition of the patient."

"In favorable cases both direct and indirect effects are concomitant. In others the indirect effects occur without reduction of the tumor. In some inoperable cases the reduction was sufficient to make possible a transabdominal or vaginal hysterectomy."

"With regard to operable cancer the author thinks that radium therapy ought not to replace surgery, but that the best results will be obtained from the combination of both methods of treatment."

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